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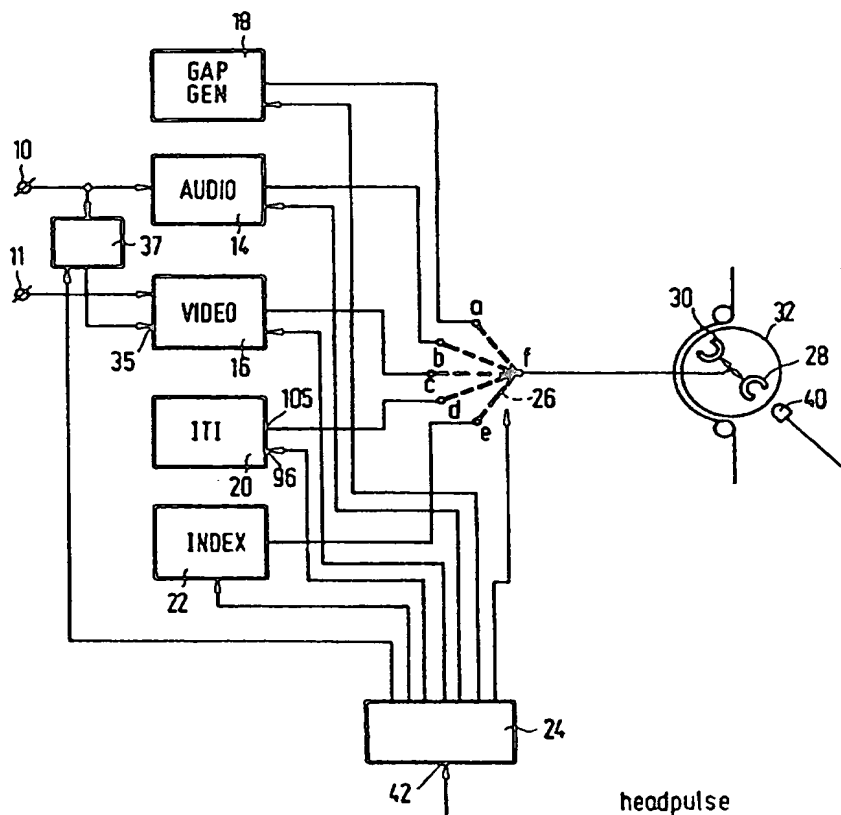
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(71) Applicant: PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).			
(71) Applicant (for SE only): PHILIPS NORDEN AB [SE/SE]; Kottbygatan 7, Kista, S-164 85 Stockholm (SE).			
(72) Inventor: VAN GESTEL, Wilhelmus, Jacobus; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).			
(74) Agent: VAN DER KRUK, Willem, Leonardus; Internationaal Octrooibureau B.V., P.O. Box 220, NL-5600 AE Eindhoven (NL).			

(54) Title: ARRANGEMENT FOR RECORDING OR REPRODUCING A DIGITAL VIDEO SIGNAL AND A CORRESPONDING DIGITAL AUDIO SIGNAL

(57) Abstract

An arrangement for recording a digital video signal and a corresponding digital audio signal in slant tracks on a longitudinal magnetic record carrier, tracks comprising an audio signal recording sector and a video signal recording sector, for storing the digital audio signal and the digital video signal respectively, comprises: first and second input terminals (10, 11) for receiving the digital audio signal and the digital video signal respectively; conversion means (14, 16, 26) for converting the digital audio and video signals so as to obtain a composite signal which can be recorded on the record carrier; recording means (28, 30) for the recording of the converted audio and video signals in said composite signal in the audio signal recording sector and the video signal recording sector respectively of a track, the video signal recording sector in a track further comprising an auxiliary signal recording part for storing the digital audio signal as well.



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Arrangement for recording or reproducing a digital video signal and a corresponding digital audio signal.

The invention relates to an arrangement for recording a digital video signal and a corresponding digital audio signal in slant tracks on a longitudinal magnetic record carrier, tracks comprising an audio signal recording sector and a video signal recording sector, for storing the digital audio signal and the digital video signal respectively, the arrangement comprising

- first and second input terminals for receiving the digital audio signal and the digital video signal respectively,

- conversion means for converting the digital audio- and video signals so as to obtain a composite signal which can be recorded on the record carrier,

- recording means for the recording of the converted audio- and video signals in said composite signal in the audio signal recording sector and the video signal recording sector respectively of a track, the video signal recording sector in a track further comprising an auxiliary signal recording part for storing an auxiliary signal. The invention also relates to an arrangement for reproducing a digital video signal and a corresponding digital audio signal

from a longitudinal magnetic record carrier, signals being recorded in slant tracks on a longitudinal magnetic record carrier, tracks comprising an audio signal recording sector and a video signal recording sector, in which a first information signal relating to the digital audio signal and a second information signal relating to the digital video signal respectively are stored, the video signal recording sector in a track further comprising an auxiliary signal

recording part in which a third information signal representing an auxiliary signal can be stored, the arrangement comprising,

- reading means for reading the signals recorded in the tracks, and for retrieving the first and second information signal originally stored in the audio signal recording sector and the video signal recording sector respectively in a track,

- reconversion means for reconverting the first information signal and the second information signal into a reproduced digital audio- and video signal respectively,

- first and second output terminals for supplying the reproduced digital audio signal and the reproduced digital video signal respectively, and to a longitudinal magnetic record carrier. A recording arrangement as given in the opening paragraph is known from EP-A 492,704,

document (1) in the list of references.

The known arrangement records a digital audio signal and a digital video signal in audio signal recording sectors and video signal recording sectors respectively, where, when recording a track, the video signal recording sector in a track comes first and is followed by the audio signal recording sector. The order in which the sectors occur in a track can however also be in the reverse order. Further, other sectors may be included in a track, such as a clock run-in area located at the beginning of a track, so as to enable a locking-in of the internal system clock on the signals read from the track, and preamble and postamble areas that are located between the various sectors and function as an edit gap. Reference is made in this respect to the earlier filed European patent applications no.93.202.950, reference (2) in the list of references and no. 93.201.263, reference (3) in the list of documents.

The video signal recording sector includes an auxiliary signal recording part for storing an auxiliary signal. This auxiliary signal can be teletext data or control data.

Both references (2) and (3) mentioned above mention the possibility of carrying out an editing function on the signals stored in the audio signal recording sector and/or the video signal recording sector.

The invention aims at improving the editing possibilities. To that purpose, the arrangement given in the opening paragraph is characterized in that the arrangement is further adapted to store the digital audio signal in the auxiliary signal recording parts of the video signal recording sectors in the tracks.

The invention is based on the recognition that editing of the audio signal recording sector means that the signals stored in the audio signal recording sector are overwritten by another audio signal. As a consequence, the original audio signal that corresponds to the video signal recorded in the video signal recording sector is lost. In accordance with the invention, the original audio signal is also recorded in the auxiliary signal recording part of the video signal recording sector. A subsequent editing of the audio signal, means that only the contents of the audio signal recording sector is affected, the contents of the video signal recording sector however remains unaffected. As a result, an edited version of the original recording has been obtained, whilst the original audio signal is still available for further editing or reviewing functions.

The recording arrangement may be further characterized in that the

conversion means are further adapted to convert the digital audio signal into a second converted digital audio signal so as to obtain the composite signal and the recording means further being adapted to record the second converted audio signal included in said composite signal in said auxiliary signal recording parts of the video signal recording sectors in the tracks. More specifically in that the conversion means comprise data compression means for data reducing the digital audio signal so as to obtain the second converted digital audio signal. This for the reason that the auxiliary signal recording part of the video signal recording sector may have an insufficient storage capacity to store the audio signal in uncompressed form. Data compression to be carried out can be done in various ways. One data compression technique that has proven to be of high quality is the data compression technique applied in the DCC digital compact cassette system. Reference is made in this respect to various publications in the literature and patent publications, such as European patent application no. 402,973, document (4) in the list of references, European patent application no. 457.390, document (5) in the list of references, and European patent application no. 457.391, document (6) in the list of references. Another example is the compression algorithm carried out in the 8 mm PCM audio recording system.

The recording arrangement may be further characterized in that the arrangement is adapted to generate an indicator signal indicating that the auxiliary signal recorded in the auxiliary signal recording parts of the video signal recording sectors in the tracks is an audio signal corresponding to the digital video signal recorded in the video signal recording sectors, signal combining means being present to combine the indicator signal into the composite signal for recording in the tracks.

In this way, a reproducing arrangement for reproducing the information recorded on the longitudinal record carrier by means of the above described recording arrangement, is capable of retrieving the audio signal from the auxiliary signal recording part of the video signal recording sectors in the tracks.

It will be clear that the invention is of great importance in camcorders, as the loss of the original audio information of own made recordings during editing is not wanted.

Reproducing arrangements for reproducing the signals from the longitudinal record carrier form the subject of the claims covering the reproducing arrangement.

These and other aspects of the invention will be apparent from and

elucidated with reference to the embodiments described in the following figure description.
In the figure description

figure 1 shows schematically the format of the signals recorded in a track on the record carrier,

5 figure 2 shows schematically the contents of the video signal recording sector,

figure 3 shows a recording arrangement described in a previous patent application,

figure 4 shows a first embodiment,

10 figure 5 shows a second embodiment of the recording arrangement in accordance with the invention,

figure 6 shows a first, and

figure 7 a second embodiment of a reproducing arrangement.

15 Figure 1 shows the format of the signals as they are recorded in a track on a magnetic record carrier by means of a helical scan videorecorder. The left end of the track 1 in figure 1 is the start of the track and the right end of the track is the terminal part of the track. The track comprises a number of track parts. The track part denoted by G1 is the pre-amble track part. An example of the preamble track part G1 has been described
20 extensively in reference (1).

The track part G1 is followed by tracking tone recording part TP4, which is denoted by ITI (insert timing information) track part and which contains a tracking tone, synchronisation information and identification (or timing) information. Further explanation of the contents of the ITI track can be found in reference (3).

25 The track part TP4 is followed by an edit gap G2. The edit gap G2 is followed by the track part TP1, which is denoted by INDEX and which comprises amongst others subcode information, such as absolute and/or relative time information and a table of contents (TOC). The edit gap G3 is followed by a track part TP2 which is the audio signal recording sector and comprises digital audio information. The edit gap G4 is followed by a
30 track part TP3 which is the video signal recording sector and comprises digital video information. The track is terminated by the track part G5.

It can be said that the sequence order in which the parts TP1, TP2 and TP3 occur in the tracks may be different. That is: the index part TP1 may follow the video signal recording sector TP3, or the audio signal recording sector TP2 and the video signal

recording sector TP3 may be exchanged.

The contents of the video signal recording sector TP3 is given in figure 2. Figure 2 in fact shows schematically the contents of a memory in which bytes of information are stored in storage locations in the memory denoted by an address (x,y), where x denotes the x-coordinate of the storage location and y denotes the y-coordinate of the storage location. The bytes are 8 bits each. The x-coordinate runs from 1 to 90 and the y-coordinate runs from 1 to 149, so that 90 bytes of information can be stored in each row, and 149 rows are present. The first two columns (x=1 and x=2) of the memory are filled with synchronisation pattern of 2 bytes long in each row. The following three bytes in each row are filled with an ID code, comprising amongst others information which indicates the row number of the memory. The last eight columns comprise horizontal parity information, 8 bytes long in each row. Vertical parity information is stored in the storage locations x=6 to x=82 inclusive of the last 11 rows.

Bytes of video signal information are stored in the storage locations x=6 to x=82 inclusive of the rows y=3 to y=137 inclusive. Bytes of auxiliary data are stored in the storage locations x=6 to x=82 inclusive of the rows having the row numbers y = 1, 2 and 138. The memory of figure 2 is read out linewise, starting with the information stored in line y=1, followed by the line y=2, and so on until the line y=149. The total information stored in the memory of figure 2 fits in the video signal recording sector TP3 of figure 1.

The auxiliary data for storage in the lines y = 1, 2 and 138 can be teletext data or control data.

It should be noted here that it can be specified that the auxiliary data will be stored in a different location in the memory. Reference is made in this respect to document (1), figure 13, where the auxiliary data is stored in the memory part denoted by III.

Figure 3 schematically shows an embodiment of a recording arrangement as schematically described in reference (3). The arrangement comprises a first and a second input terminal 10 and 11 respectively, for receiving a digital audio signal and a digital video signal respectively. The video signal can be generated by an optical picture pickup system of a camcorder and the corresponding audio signal can be generated by the microphone of the said camcorder. After digitization, both signals can be applied to the terminals 10 and 11. The digital audio signal can be converted in the conversion means 14 in a way as described in document (1). The digital video signal can be converted in the conversion means 16 in a way as also described in document (1). The order in which the blocks of audio- and video

information are recorded in a track is however in the reverse order as described in the said patent application.

The arrangement comprises an edit-gap signal generator 18, a tracking tone signal (or ITI signal) generator 20, an index generator 22 and a central processing unit 24. Outputs of the generators 18, 20 and 22, and of the conversion means 14 and 16 are each coupled to a corresponding terminal of a multi-position switch 26, an output terminal (f) of which is coupled to write heads 28 and 30, preferably via a channel modulator (not shown), which heads are accommodated on a rotatable head drum 32. Further, an auxiliary signal generator 15 is present for supplying the auxiliary signal for storage in the video signal recording sector TP3. To that purpose, an output of the generator 15 is coupled to a second input 35 of the video signal conversion means 16.

The central processing unit 24 is adapted to control and activate the generators 15, 18, 20 and 22, the conversion means 14 and 16 and the switch 26. A control signal input 42 of the central processing unit 24 is coupled to an output of a detector 40, which is located at a stationary position near the circumference of the head drum 32, which detector 40 supplies pulses for each rotation of the head drum, the pulses being a measure for the time instants that the start point of a new track is written.

At the start of the recording of a new track, like the track in figure 1, the central processing unit 24 generates a control signal for the edit gap generator 18, in response to a pulse applied to its input 42. Further, the unit 24 generates a control signal to the switch 26. Under the influence of this control signal, the switch positions itself in a position in which the terminals a and f are interconnected. The generator 18 generates the pre-amble signal for recording in the G1 track part of the track. Next the unit 24 generates a control signal to the generator 20 and a control signal to the switch 26, such that it interconnects its terminals d and f. The generator 20 generates the ITI information for recording in the trackpart TP4. An embodiment of the generator 20 has been described in reference (3).

Now the central processing unit 24 generates a control signal to the edit-gap generator 18, and a control signal to the switch 26, which is again positioned in the position a-f. The generator 18 generates the edit gap signal, for recording the edit gap G2. Subsequently the processing unit 24 generates a control signal to the INDEX generator 22, and a control signal to the switch, which is now positioned in the position e-f. The generator 22 generates the signal for recording in the track part TP1 of the track in figure 1.

Next, the processing unit 24 supplies a control signal to the edit-gap

generator 18 and the switch 26, so that the switch is again positioned into the position a-f. The generator 18 generates the edit gap signal, for recording the edit gap G3. This is followed by the generation of a control signal which is supplied to the audio conversion means 14, and a control signal to the switch 26, which is controlled into the position b-f.

- 5 The audio information can now be recorded so as to obtain the audio signal recording sector TP2 of the track.

Next, the processing unit 24 supplies a control signal to the edit-gap generator 18 and the switch 26, so that the switch is again positioned into the position a-f. The generator 18 generates the edit gap signal, for recording the edit gap G4. This is
10 followed by the generation of a control signal which is supplied to the generator 15, the video conversion means 16, and a control signal to the switch-26, which is controlled into the position c-f. The generator 15 supplies the auxiliary information for storage in the three lines of the memory of figure 2, as described above. Next, the conversion means 16
15 generates an information stream as described with reference to figure 2, where the contents of the memory of figure 2 is read out linewise. The video information can now be recorded by one of the heads 28 or 30 so as to obtain the video signal recording sector TP3 of the track.

It should be noted here, that the memory of figure 2 is for explanatory purposes, for one reason, because of the fact that the sync information and the ID codewords
20 need not be stored in the memory, but can be added to the serial datastream when retrieving the video data and the auxiliary data from the memory. The storage capacity of the memory is then smaller and comprises only 85 columns of storage locations.

Finally, the processing unit 24 supplies a control signal to the edit-gap generator 18 and the switch 26, so that the switch is again positioned into the position a-f.
25 The generator 18 generates the edit gap signal for recording as the post-amble track part G5.

This recording process is repeated when recording subsequent tracks.

Editing the audio signal recorded in the audio signal recording sector TP2 means that another audio signal is applied to the input 10 and that this audio signal is converted in the converter 14 and subsequently recorded in the sector TP2 of the previously
30 recorded track by overwriting the originally recorded audio information recorded in said sector TP2. The information recorded in the other track parts of the said track remains unchanged. In this way, a new audio signal can be recorded for a later reproduction together with the original video signal. The consequence of this editing function is however, that the original audio signal has been lost.

Figure 4 shows an embodiment of the recording arrangement of the present invention that overcomes this problem. The embodiment shows large resemblances with the embodiment of figure 3. In accordance with the invention, the input terminal 10, which receives the audio signal, is further coupled to a converter 37, which has its output
5 coupled to the second input 35 of the converter 16. The converter 37 converts, under the influence of a control signal from the processing unit 24, the audio signal into such a form that it can be stored as auxiliary signal in the memory locations in the lines $y = 1, 2$ and 138, so that it can be stored in the video signal recording sector TP3 as if it was the auxiliary signal described above.

10 If the memory space available is insufficient for the processing of a wideband digital audio signal, data compression on the audio signal is required, and can be carried out in the converter 37.

An example: suppose that one picture, that is one videoframe of videoinformation, is stored in 12 tracks, and the frame rate is 25 frames/s, this means that
15 the bitrate of the auxiliary signal to be stored in the three lines can have a bitrate at the maximum of 554,4 kb/s ($= 12 \times 25 \times 3 \times 77 \times 8$). This bitrate is sufficiently large for transmitting a data compressed audio signal that is compressed in accordance with the DCC (digital compact cassette) compression algorithm, which results in a bitrate of 384 kb/s for a compressed digital stereo audio signal.

20 In the embodiment of figure 4, the generator 15 of figure 3 has been left out. Figure 5 shows an embodiment of the invention, where the generator 15 has been introduced again. Outputs of the generator 15 and the converter 37 are coupled to terminals c and a respectively of a switch 38, which has a fixed terminal b coupled to the second input 35 of the converter 16. The user of the arrangement can decide whether an auxiliary signal
25 or an audio signal will be stored in the auxiliary signal recording parts of the video signal recording sector TP3. Upon actuation of a button (not shown) by the user, the processor 24 generates a control signal via the line 39 so that the switch is positioned in either the position shown in figure 5, or the other position of the switch, shown by the broken line. In order to identify the nature of the signal recorded as auxiliary signal, the converter 37 can generate an
30 indicator signal, identifying the auxiliary signal as an audio signal. This indicator signal can eg. be stored in the ITI sector TP4 or in the auxiliary signal itself. The auxiliary signal can be transmitted in packets of five bytes each. The first byte in the packet can be used to include the said indicator signal. Also the generator 15 can generate a corresponding indicator signal identifying the auxiliary signal as a certain auxiliary signal.

Figure 6 shows schematically only the most relevant parts of a reproducing arrangement in accordance with the invention. The information recorded in the tracks is read out by means of the heads 28 and 30 and supplied to a sync detector 60 for detecting the synchronization information as included in the sync area, see figure 2. In response to the detection of the synchronization information, as well as the head pulses supplied by the head 40, the processor unit 61 generates control signals to reconverter units 63 and 64 and to a switch 65. When the gap G3, see figure 1, is detected (by means not shown), the switch 65 is positioned in the position a-c, so that the information included in the audio signal recording sector TP2 is fed to the reconversion unit 63. The reconversion unit 63 carries out a signal processing on the signal received in an inverse manner as the converter unit 14 of figure 4, so that a replica of the original-audio signal is supplied to its output 66. When the gap G4, see figure 1, is detected (by means not shown), the switch 65 is positioned in the position b-c, so that the information included in the video signal recording sector TP3 is fed to the reconversion unit 64. The information is stored in said reconversion unit 64, eg. in the way as shown in figure 2. The reconversion unit 64 retrieves the video information from the information stored in the memory and carries out a signal processing on the signal retrieved in an inverse manner as the converter unit 16 of figure 4, so that a replica of the original video signal is supplied to its output 67, and via this output 67 to the video signal output terminal 72.

The reconversion unit 64 also retrieves the auxiliary signal from the lines $y = 1, 2$ and 138 and supplies the signal to the output 68. This output is coupled to an input of a reconversion unit 69, in which a signal processing inverse to the signal processing carried out in the converter 37 of figure 3 is carried out. As a result a replica of the original audio signal is also available at the output 73 of the reconversion unit 69.

Output means for outputting either one of the two audio signals are present in the form of a switch 70. With the switch 70 in the upper position, the audio signal regenerated by the reconversion unit 63 is supplied to the output terminal 71. With the switch 70 in the lower position, the audio signal regenerated by the reconversion unit 69 is supplied to the output terminal 71.

The switch can be actuated by hand.

In another embodiment, shown in figure 7, the reproducing arrangement comprises an indicator signal detector (not shown), for detecting the indicator signal indicating the type of signal transmitted as the auxiliary signal in the video signal recording sectors TP3. The second output 68 of the reconversion unit 64 is now coupled to the fixed

terminal a of a switch 75. A terminal b of the switch 75 is coupled to an auxiliary output terminal 76, and a terminal c of the switch 75 is coupled to a second audio output terminal 77 via the reconversion unit 69.

5 Upon detecting an indicator signal, indicating that an audio signal is included in the auxiliary signal recording parts of the video signal recording sectors in the tracks, a control signal is generated and applied to a control signal input (not shown) of the switch 75, which positions the switch in the position a-c. If the auxiliary signal recording parts of the video signal recording sectors include an auxiliary signal, not being an audio signal, another control signal is generated, under the influence of which the switch is
10 positioned in the a-b position, so that the auxiliary signal can be outputted at the terminal 76.

The invention is thus based on the storage of the audio signal corresponding to a video signal in the auxiliary signal recording parts of the video signal recording sectors in the tracks, so as to enable editing on the audio signal in the audio signal recording sectors without losing the original audio information.

References

- (1) European patent application no. 492,704 (PHN 13.546)
- (2) European patent application no. 93.202.950 (PHN 14.241)
- 5 (3) European patent application no. 93.201.263 (PHN 14.449)
- (4) European patent application no. 402,973 (PHN 13.241)
- (5) European patent application no. 457.390 (PHN 13.328)
- (6) European patent application no. 457.391 (PHN 13.329)

CLAIMS

1. Arrangement for recording a digital video signal and a corresponding digital audio signal in slant tracks on a longitudinal magnetic record carrier, tracks comprising an audio signal recording sector and a video signal recording sector, for storing the digital audio signal and the digital video signal respectively, the arrangement comprising
- 5 - first and second input terminals for receiving the digital audio signal and the digital video signal respectively,
- conversion means for converting the digital audio- and video signals so as to obtain a composite signal which can be recorded on the record carrier,
- recording means for the recording of the converted audio- and video signals in said
- 10 composite signal in the audio signal recording sector and the video signal recording sector respectively of a track, the video signal recording sector in a track further comprising an auxiliary signal recording part for storing an auxiliary signal,
- characterized in that the arrangement is further adapted to store the digital audio signal in the auxiliary signal recording parts of the video signal recording sectors in the tracks.
- 15 2. Arrangement as claimed in claim 1, characterized in that the conversion means are further adapted to convert the digital audio signal into a second converted digital audio signal so as to obtain the composite signal and the recording means further being adapted to record the second converted audio signal included in said composite signal in said auxiliary signal recording parts of the video signal recording sectors in the tracks.
- 20 3. Arrangement as claimed in claim 2, characterized in that the conversion means comprise data compression means for data reducing the digital audio signal so as to obtain the second converted digital audio signal.
4. Arrangement as claimed in anyone of the preceding claims, characterized in that the arrangement is adapted to generate an indicator signal indicating that the auxiliary
- 25 signal recorded in the auxiliary signal recording parts of the video signal recording sectors in the tracks is an audio signal corresponding to the digital video signal recorded in the video signal recording sectors, signal combining means being present to combine the indicator signal into the composite signal for recording in the tracks.
5. Arrangement for reproducing a digital video signal and a corresponding

digital audio signal from a longitudinal magnetic record carrier, signals being recorded in slant tracks on a longitudinal magnetic record carrier, tracks comprising an audio signal recording sector and a video signal recording sector, in which a first information signal relating to the digital audio signal and a second information signal relating to the digital video signal respectively are stored, the video signal recording sector in a track further comprising an auxiliary signal recording part in which a third information signal representing an auxiliary signal can be stored, the arrangement comprising,

- reading means for reading the signals recorded in the tracks,
- reconversion means for reconvertng the first information signal and the second information signal into a reproduced digital audio- and video signal respectively,
- first and second output terminals for supplying the reproduced digital audio signal and the reproduced digital video signal respectively,

characterized in that a third information signal which relates to the digital audio signal is stored in the auxiliary signal recording part of the video signal recording sector in a track, the reconversion means being adapted to reconvert the third information signal into the reproduced digital audio signal, the arrangement further comprising output means for outputting the reproduced digital audio signal obtained after reconversion from the third information signal.

6. Arrangement as claimed in claim 5, characterized in that the reconversion means comprise data expansion means for carrying out data expansion on the third information signal so as to obtain the reproduced digital audio signal from said third information signal.

7. Arrangement as claimed in claim 5 or 6, characterized in that an indicator signal indicating that the third information signal recorded in the auxiliary signal recording parts of the video signal recording sectors in the tracks is an audio signal corresponding to the digital video signal recorded in the video signal recording sectors, retrieving means being present to retrieve the indicator signal from the information read from the tracks.

8. Arrangement as claimed in claim 7, characterized in that the output means are adapted to output the reproduced digital audio signal to an audio output terminal in response to the occurrence of said indicator signal.

9. Arrangement as claimed in any one of the preceding claims, characterized in that, the arrangement is in the form of a camcorder.

10. Longitudinal magnetic record carrier obtained by means of the recording arrangement as claimed in any one of the claims 1 to 4 or 9, as far as dependent of one of

the claims 1 to 4, characterized by the features in any one of those claims that characterize the record carrier.

1/5

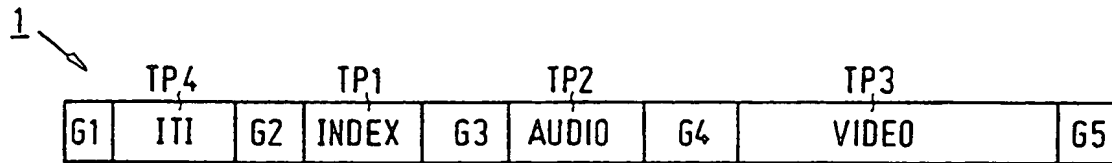


FIG. 1

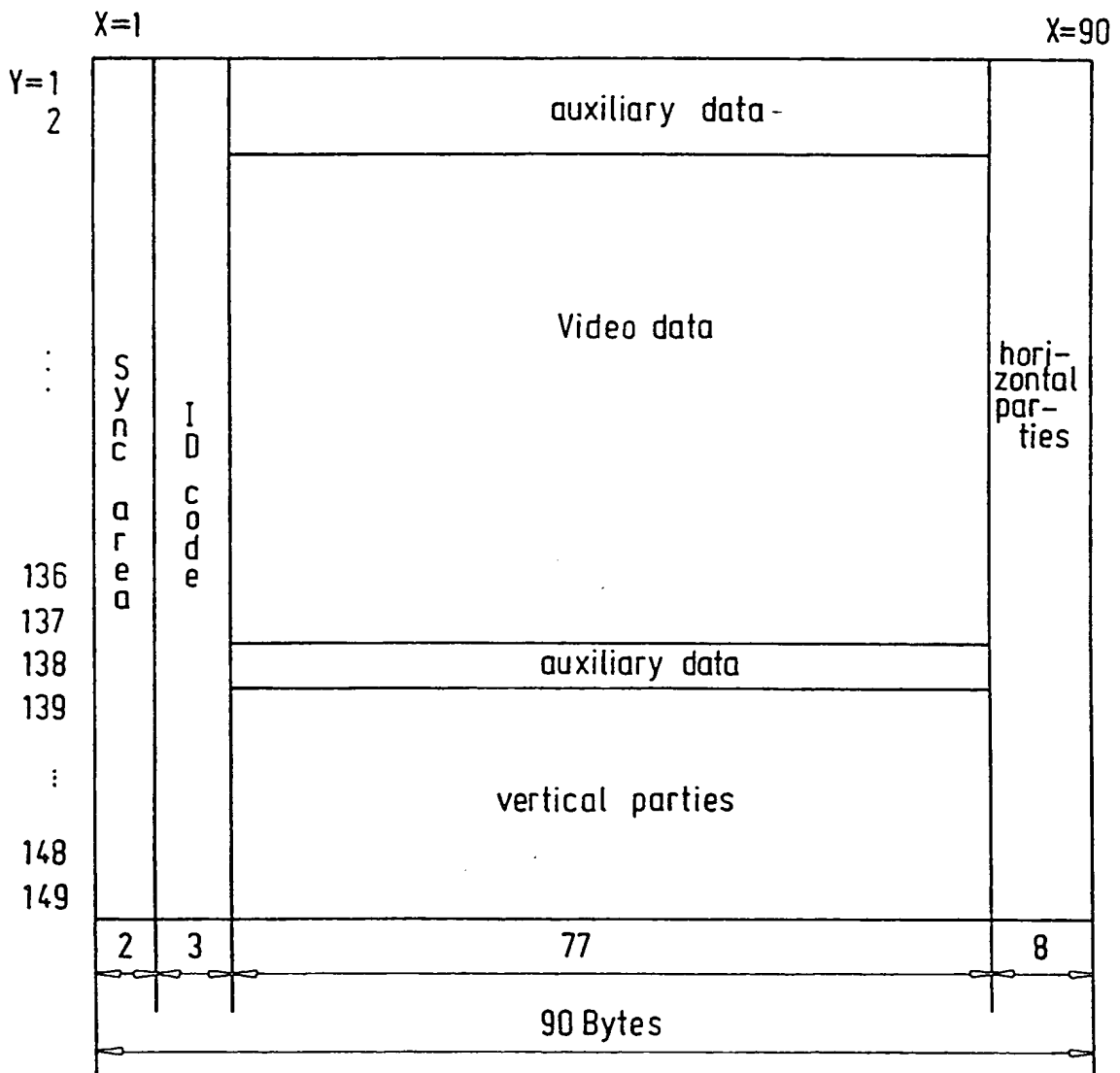


FIG. 2

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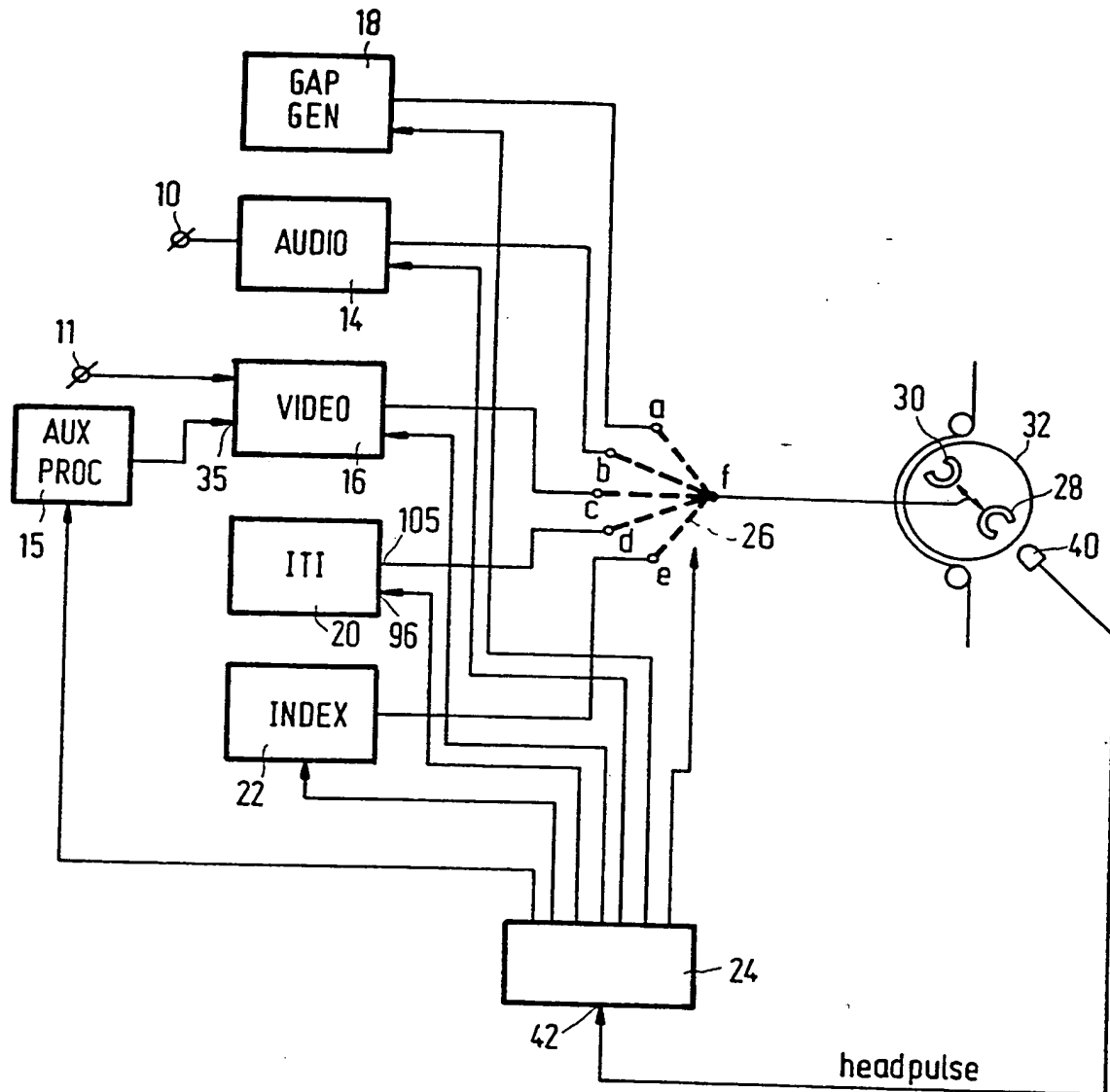


FIG. 3

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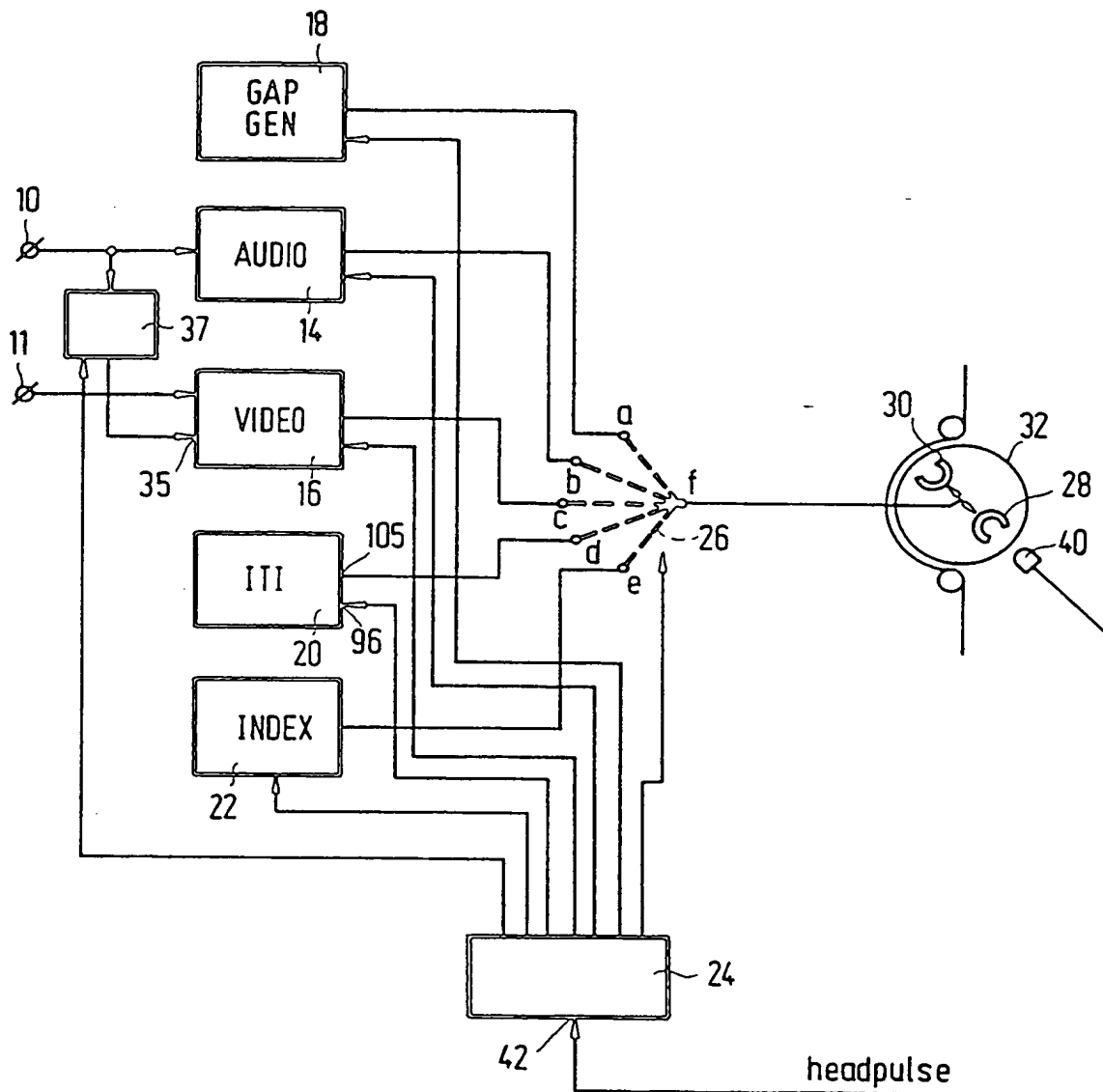


FIG. 4

4/5

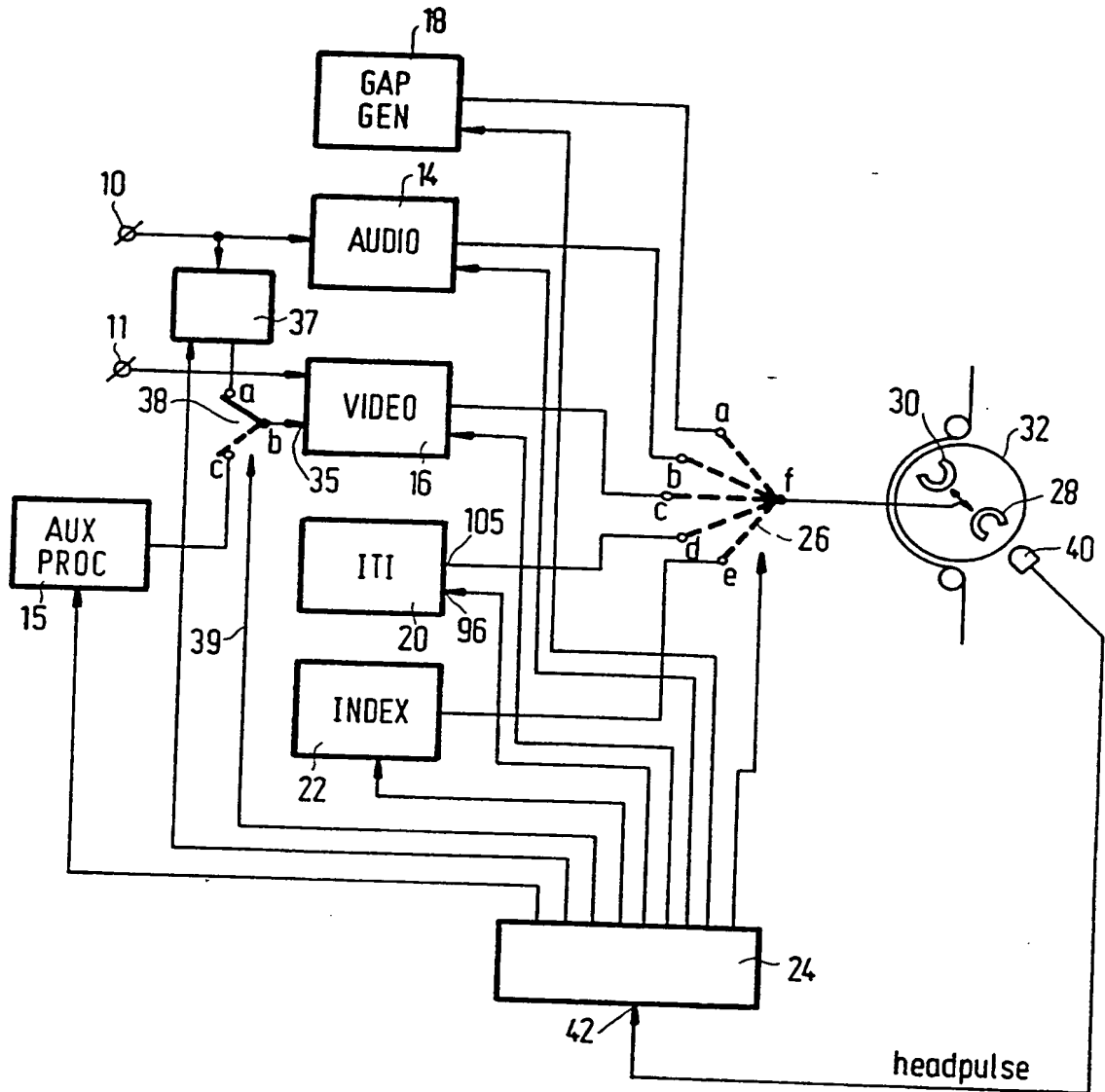


FIG. 5

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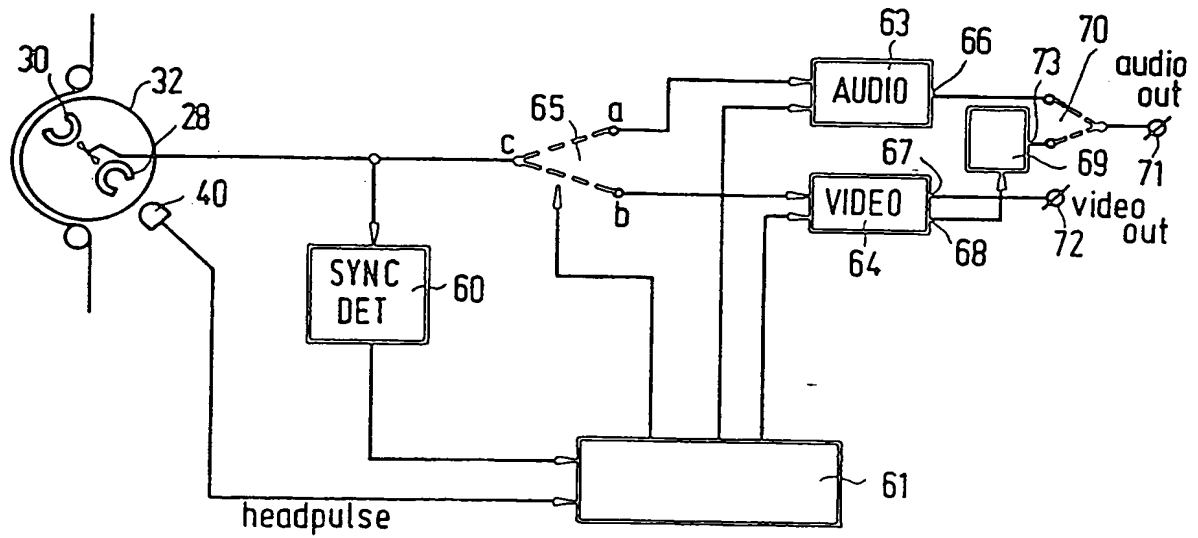


FIG. 6

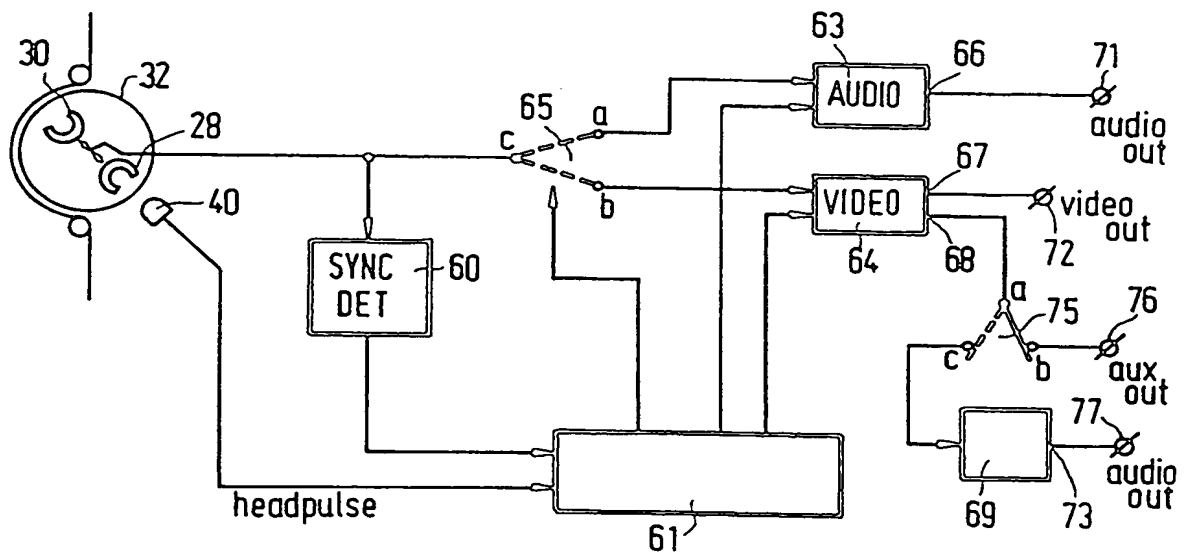


FIG. 7

1
INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 95/00063

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G11B 20/12, G11B 27/032, H04N 5/7826, H04N 9/80
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G11B, H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, CLAIMS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP, A1, 0574889 (SONY CORPORATION), 22 December 1993 (22.12.93), page 3, line 54 - page 6, line 16; page 8, line 38 - page 11, line 16	1,2,5,6,10
A	--	3,4,7-9
Y	EP, A2, 0470472 (HITACHI, LTD), 12 February 1992 (12.02.92), column 3, line 44 - column 7, line 39	1,2,5,6,10
A	--	3,4,7-9

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

8 May 1995

Date of mailing of the international search report

06 -06- 1995

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. + 46 8 666 02 86

Authorized officer

Bo Gustavsson
Telephone No. + 46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 95/00063

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5121259 (KEITARO YAMASHITA), 9 June 1992 (09.06.92), column 3, line 30 - column 7, line 39	1,2,5,6,10
A	--	3,4,7-9
A	EP, A2, 0595411 (PHILIPS ELECTRONICS N.V.), 4 May 1994 (04.05.94), see whole document, cited in the application	1,5
A	--	
A	US, A, 5276560 (ISAO SAITO ET AL), 4 January 1994 (04.01.94), see whole document	1,5
A	--	
A	EP, A1, 0542576 (SONY CORPORATION), 19 May 1993 (19.05.93), see whole document	1,5

INTERNATIONAL SEARCH REPORT
Information on patent family members

01/04/95

International application No.
PCT/IB 95/00063

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0574889	22/12/93	NONE	
EP-A2- 0470472	12/02/92	JP-A- 4095202 US-A- 5323273	27/03/92 21/06/94
US-A- 5121259	09/06/92	CA-A- 2003195 EP-A, A, A 0370670 JP-A- 2141901	22/05/90 30/05/90 31/05/90
EP-A2- 0595411	04/05/94	NONE	
US-A- 5276560	04/01/94	JP-A- 4047566	17/02/92
EP-A1- 0542576	19/05/93	JP-A- 5144236 US-A- 5396374	11/06/93 07/03/95